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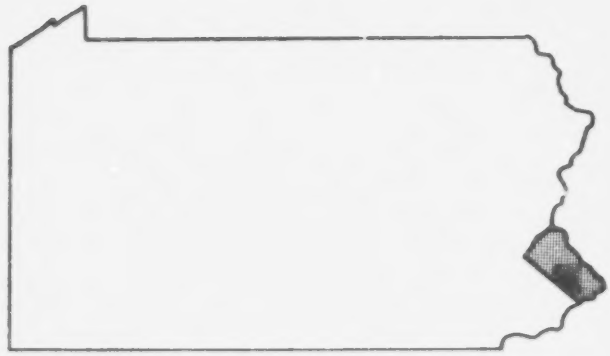
FLOOD INSURANCE STUDY

TOWNSHIP OF NEW BRITAIN, PENNSYLVANIA
BUCKS COUNTY



MARCH 4, 1988

Federal Emergency Management Agency

COMMUNITY NUMBER - 420987

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance study purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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Flood Boundary and Floodway Map

PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index
Flood Insurance Rate Map

FLOOD INSURANCE STUDY
TOWNSHIP OF NEW BRITAIN, BUCKS COUNTY, PENNSYLVANIA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Township of New Britain, Bucks County, Pennsylvania, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in their efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses in this study represent a revision of the original analyses prepared by the Delaware River Basin Commission (DRBC) for the Federal Emergency Management Agency (FEMA), under Contract No. H-3747. The work for the original study was completed in November 1976. The hydrologic and hydraulic analyses for the original study were conducted by E. H. Bourquard Associates, Inc., under subcontract to DRBC. Survey and topographic data for the original study were compiled by Quinn and Associates under subcontract with E. H. Bourquard Associates.

The hydrologic and hydraulic analyses in this updated study were prepared by the DRBC, under Contract No. EMW-85-C-1876, for FEMA. This study was completed in September 1986.

1.3 Coordination

On November 24, 1984, a initial Consultation and Coordination Officer's (CCO) meeting was held with representatives from FEMA, the township, and the DRBC (the study contractor) to determine the streams to be studied by detailed methods. The following agencies were contacted to obtain pertinent information for this study: the

Philadelphia District of the U. S. Army Corps of Engineers (COE), the Soil Conservation Service (SCS), the Neshaminy Water Resources Authority, the Pennsylvania Department of Environmental Resources, the U. S. Geological Survey (USGS), and the Bucks County Planning Commission (BCPC).

Basic data for this report was coordinated with all levels of government and private concerns. Mapping information was coordinated with the BCPC, the township, and the USGS to obtain a base map and to locate flood prone areas. Coordination of hydrologic and hydraulic data was made with the USGS, the Philadelphia District of the COE, A. W. Martin Associates, Inc., the SCS, and the Pennsylvania Departments of Transportation (PENNDOT) and Environmental Resources (PADER). Several meetings were held to coordinate this study with the Flood Insurance Study for the Borough of Chalfont.

On April 20, 1987, a final CCO meeting was held with representatives from FEMA, the township, and the study contractor to review the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Township of New Britain, Bucks County, Pennsylvania. Located within the Township of New Britain but not included in this study is the Borough of Chalfont. The area of study is shown on the Vicinity Map (Figure 1).

The following streams were studied by detailed methods: Neshaminy Creek, for its entire length within the community; West Branch Neshaminy Creek, for its entire length within the community; Tributary to West Branch Neshaminy Creek, for its entire length within the community; and Railroad Creek, from approximately 3,200 feet upstream of its confluence with West Branch Neshaminy Creek. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction through September 1991.

Two unnamed tributaries to West Branch Neshaminy Creek were studied by approximate methods. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the Township of New Britain.

2.2 Community Description

The Township of New Britain is located in west-central Bucks County approximately 23 miles north of Philadelphia in eastern

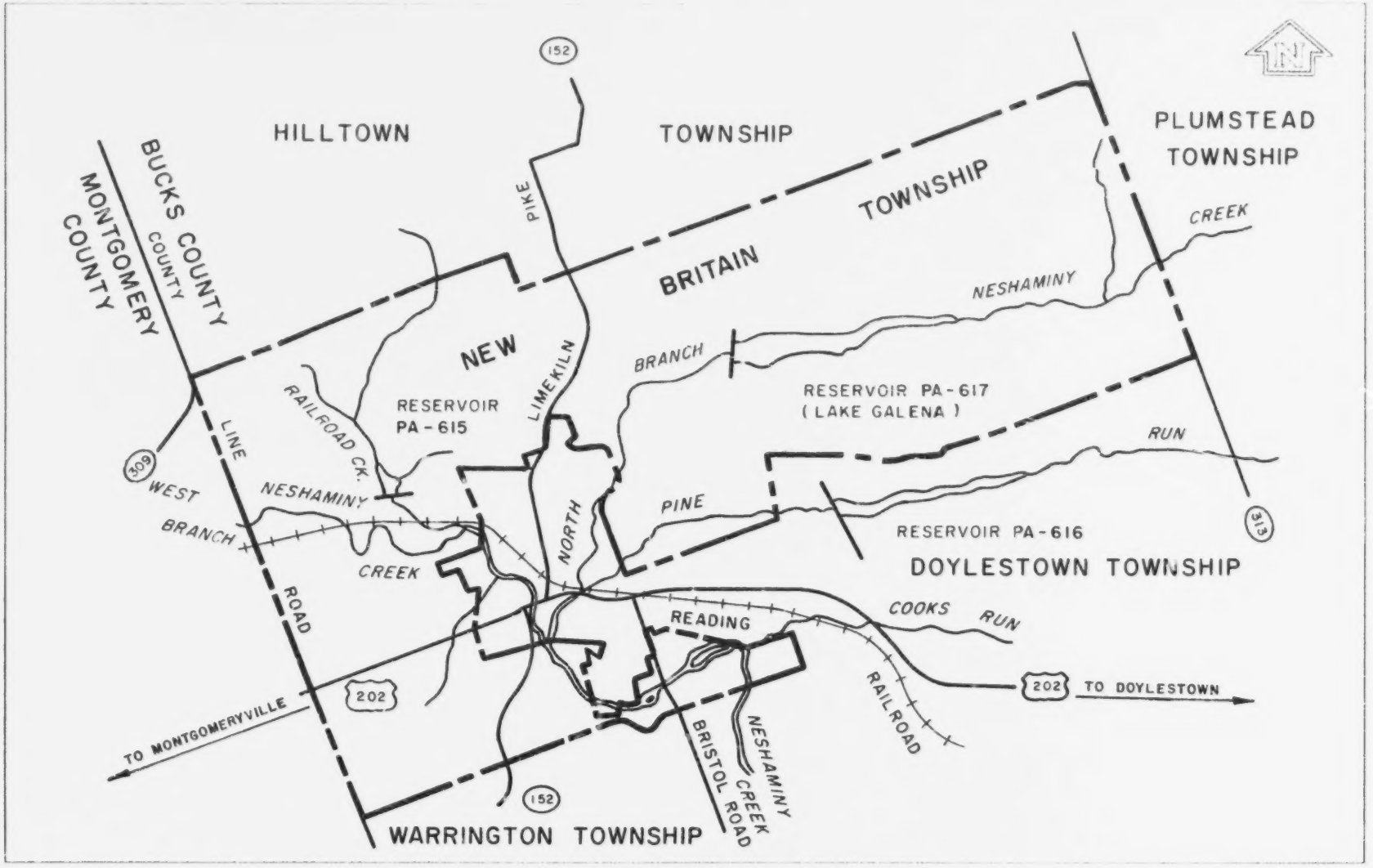


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF NEW BRITAIN, PA
(BUCKS CO.)

APPROXIMATE SCALE

1 0 1 2 3 MILES

VICINITY MAP

Pennsylvania. It is bordered by the Townships of Hatfield and Montgomery to the southwest, the Township of Hilltown to the northwest, the Township of Plumstead to the northeast, and the Townships of Warrington and Doylestown to the southeast.

In 1940, the population of the township was 1,119; in 1950, the population was 1,367; in 1960, the population was 3,090; in 1970, the population was 5,207; and in 1980, the population was 7,415 (Reference 1).

The western portion of the township is primarily farmland. In the eastern portion of the township, near the Boroughs of Chalfont and New Britain, much of the land is designated for development. Over 70 percent of the township is farmland or unused land and slightly more than 20 percent is residential. Very little development has occurred in the floodplains.

The Township of New Britain was settled later than the surrounding communities for several reasons. The Indians did not sell the land until 1697, 15 years after Pennsylvania's first land purchase in 1682. When the land was sold, the buyers were non-residents, chiefly a London assocation called the Free Society of Traders. Their plans for a feudal manor were, for unknown reasons, never put into action and the land was sold in 1723.

The first settlers were Welsh Baptists, whose petition for organization as a township was first presented in 1723. It was, however, several years later that the actual organization took place. It is believed that the name New Britain did not come into usage until the late 1720s.

Among the early settlers in the Township of New Britain were Squire and Mary Boone, parents of Daniel Boone. In 1728, they bought 147 acres in the southwestern portion of the township. They later moved to Berks County where Daniel was born in 1734.

The township is drained by four major streams, the North Branch Neshaminy Creek, the West Branch Neshaminy Creek, the main stem of the Neshaminy Creek, and Pine Run. Almost all of the township's 15.3 square mile area drains into these four streams and their tributaries. Two flood control dams, one on Pine Run and one on the North Branch Neshaminy Creek, provide downstream flood protection to portions of the Township of New Britain. Stream bed slopes within the township vary with the tributaries being steeper than the main streams.

The Township of New Britain is in central Bucks County, which is one of the warmest parts of Pennsylvania. The average daily temperature ranges from a minimum of 24 degrees Fahrenheit (^{o}F) in January to a maximum of 87^{o}F in July. Although temperatures of below 0^{o}F and above 100^{o}F do occur, they are rare. One or two days of below 0^{o}F temperature are all that can be expected during a normal year.

Temperatures above 90°F are experienced on an average of 25 days each year.

Rainfall in New Britain averages approximately 43 inches annually. A little over half this amount falls in the warm seasons from April through September and is in the form of showers and thunderstorms. These showers and thunderstorms vary in duration and intensity and are almost always localized. Storms producing snowfall occur from December through March and are more extensive than the summer storms. Because they cover a wider area, the precipitation that they produce is less intense than that of the summer storms. There are exceptions, however, in the form of moisture laden storms that move northward along the Atlantic coast. These storms can bring near blizzard conditions to the area but are generally of short duration.

The township lies in what is known as the Piedmont Physiographic Province. This area is characterized by rolling hills. The soil type is of the Abbotstown-Doylestown-Reaville Association.

2.3 Principal Flood Problems

Flooding occurs on Neshaminy Creek, North and West Branch Neshaminy Creeks, and Pine Run that reach high stages in the township. Flooding also occurs along tributaries to these streams. Property damage from flooding is isolated since little development has occurred in the floodplains of these streams. Potential development does, however, exist for this area.

Floods in 1933, 1955, and 1971 were large magnitude floods. The August 1955 flood was the largest flood recorded for the Neshaminy Creek basin and has been estimated by the SCS to have a recurrence interval of 100 years.

2.4 Flood Protection Measures

Flooding along Neshaminy Creek, North Branch Neshaminy Creek, and Pine Run is controled by two existing upstream flood control reservoirs: Reservoirs PA-617, located on North Branch Neshaminy Creek in the Township of New Britain and PA-616, located on Pine Run in the Township of Doylestown. Flooding on West Branch Neshaminy Creek and Railroad Creek is controlled by two existing upstream flood control reservoirs: PA-615, located on Railroad Creek and PA-625, located on Unionville Tributary in the Township of Hilltown. These reservoirs are part of a plan for the installation of 10 flood control reservoirs in the Neshaminy basin that are being implemented by Bucks and Montgomery Counties, the SCS, and the U. S. Department of Agriculture. All these reservoirs are maintained and operated by the Neshaminy Water Resources Authority.

A small detention basin is located on the Top of the Hill Farm development site near the headwaters of Tributary to West Branch

Neshaminy Creek. This basin provides protection immediately downstream of the dam; however, its effects diminish rapidly downstream due to relatively large gains in uncontrolled drainage area. The Township of New Britain utilizes the county operated flood warning system to keep its residents alerted to anticipated flood stages.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied in detail affecting the community.

For Neshaminy Creek and West Branch Neshaminy Creek, peak frequency-discharge curves for the 10-, 50-, 100-, and 500-year floods were determined using criteria in the Basin-Wide Program for Flood Plain Delineation and USGS Water Supply Paper 1672 (References 2 and 3). These discharges were then modified by calculations that incorporated the effects of flood control reservoirs PA-616 and PA-617. These were compared to flows used for the Flood Insurance Study for the Borough of Chalfont (Reference 4). The flows determined using USGS Water Supply Paper 1672 showed the best agreement with the Chalfont study and were selected for use in this study. The method used employs regionalization of many stream gaging station records in terms of similar topographic and geologic characteristics and flood frequency characteristics. Curves of mean annual flood versus drainage area size yield mean annual flood values for any location within the northeastern United States.

Adjustment factors applied to the mean annual flood yield floods of the desired recurrence interval. Further adjustment of the discharge-frequency relationship for upstream flood control storage was obtained by computing peak discharges for uncontrolled drainage areas below the reservoir site to the point of concern, adding in the effect of the reservoirs on peak inflow into the reservoir through correlation of peak inflow versus peak outflow data furnished by the SCS.

The rational method was used to compute flood flows for Tributary to West Branch Neshaminy Creek. The discharge for the 500-year flood, which was not directly available from the analytical data, was determined by the extrapolation of a curve of analytically computed flood discharges plotted on log-log graph paper.

For the remainder of West Branch Neshaminy Creek and Railroad Creek, the Harrisburg office of the SCS supplied 12-hour duration hydrographs. The peak flows for the 10-, 50-, 100-, and 500-year floods on West Branch Neshaminy Creek were calculated for points upstream and downstream. The SCS provided peak discharges by the following equation:

$$Q_u/Q_d = (A_u/A_d)^{0.8}$$

where Q_u is the discharge usptream and Q_d is the discharge downstream of the point given by the SCS, A_u is the area upstream and A_d is the area downstream of the point given by the SCS, and 0.8 is a transfer coefficient.

Discharges for the 10-, 50-, 100-, and 500-year floods for Railroad Creek are completely controlled by the flood detention structure.

A summary of the drainage area-peak discharge relationships for the streams studied by detailed methods is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
NESHAMINY CREEK					
At downstream corporate limits (southern)	62.4	6,954	10,170	11,550	16,895
At Bristol Road	59.1	6,544	9,660	10,976	15,805
WEST BRANCH NESHAMINY CREEK					
At confluence of Railroad Creek	23.7	2,850	4,300	5,040	6,650

TABLE 1 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
WEST BRANCH NESHAMINY CREEK (continued)					
At upstream corporate limits	17.8	2,270	3,420	4,010	5,290
TRIBUTARY TO WEST BRANCH NESHAMINY CREEK					
At Borough of Chalfont corporate limits	.79	645	845	928	1,210
At Route 202	.62	518	683	745	965
At Cornwall Drive	.46	398	530	578	745
RAILROAD CREEK					
At confluence with West Branch Neshaminy Creek	3.7	115	115	115	120

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross sections for the backwater analyses of the streams studied by detailed methods were obtained from aerial survey in the overbanks and field survey of the channel. Waterway openings, widths, and road elevations at bridges and culverts were measured in order to compute the significant backwater effects of these structures.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 2).

Water-surface elevations of floods of the selected recurrence intervals were computed using the COE HEC-2 step-backwater computer program (Reference 5). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals. Starting water-surface elevations for Neshaminy Creek were taken from the COE Flood Plain Information Report (Reference 6). Starting water-surface elevations for West Branch Neshaminy Creek were taken from the profile of Neshaminy Creek. Starting water-surface elevations for Tributary to West Branch Neshaminy Creek and Railroad Creek were computed using the slope/area method.

Channel roughness factors (Manning's "n") used in the hydraulic computations were selected from a review of aerial photographs at a scale of 1:12,000 and from field reconnaissance (Reference 7).

Stream	Channel "n"	Overbank "n"
Neshaminy Creek	0.035 - 0.050	0.075 - 0.100
West Branch Neshaminy Creek	0.022 - 0.055	0.055 - 0.120
Tributary to West Branch Neshaminy Creek	0.035 - 0.050	0.075 - 0.100
Railroad Creek	0.040	0.150

For the streams studied by approximate methods, typical cross sections were obtained from available topographic maps (Reference 8). An estimate of the 100-year discharge at the cross section was made based on use of the rational method of obtaining rainfall-runoff discharges. Normal depth was determined for each cross section and the resulting approximate flood limits were interpolated between each location.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the maps.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study produces maps designed to assist communities in developing floodplain management measures.

4.1 Flood Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. For Neshaminy Creek and Tributary to West Branch Neshaminy Creek, between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24,000 with a contour interval of 10 feet (Reference 8). For the restudy of West Branch Neshaminy Creek and Railroad Creek, the boundaries were interpolated using topographic maps at a scale of 1:4,800 with a contour interval of 4 feet (Reference 9).

The 100- and 500-year floodplain boundaries are shown on the Flood Boundary and Floodway Map (Exhibit 2). In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, the 100-year flood boundaries were delineated using the top width determination developed from normal depth calculations and topographic maps (Reference 9).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the floodplain. The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 2). Portions of the floodway widths for Neshaminy Creek extend beyond the corporate limits.

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway boundaries were computed at cross sections. Between cross sections, the boundaries were interpolated. In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Neshaminy Creek								
A	196,690[1]	236	1,639	7.0	229.0	229.0	229.8	0.8
B	197,690[1]	503	3,116	3.7	231.5	231.5	232.5	1.0
C	198,490[1]	328[3]	2,180	5.3	232.7	232.7	233.5	0.8
D	199,890[1]	1,260	4,495	2.6	235.1	235.1	235.9	0.8
E	200,570[1]	523	4,419	2.6	235.7	235.7	236.5	0.8
F	201,530[1]	342	2,755	4.1	236.3	236.3	237.0	0.7
G	201,730[1]	270	3,369	3.1	237.4	237.4	238.0	0.6
H	202,050[1]	359	2,993	3.5	237.7	237.7	238.2	0.5
I	202,570[1]	477	3,608	2.9	238.5	238.5	239.2	0.7
J	203,130[1]	326	2,658	4.0	239.2	239.2	239.8	0.6
K	206,370[1]	110	1,312	8.1	243.8	243.8	244.5	0.7
L	207,690[1]	290	3,196	3.3	246.3	246.3	247.0	0.7
West Branch Neshaminy Creek								
A	590[2]	415	2,365	2.1	251.2	251.2	252.0	0.8
B	1,540[2]	475	2,187	2.3	253.2	253.2	253.6	0.4
C	4,290[2]	350	2,162	2.3	257.8	257.8	258.4	0.6
D	5,190[2]	289	1,634	3.1	259.3	259.3	260.1	0.8
E	5,810[2]	301	1,791	2.8	260.3	260.3	261.3	1.0
F	6,810[2]	400	2,009	2.5	261.5	261.5	262.5	1.0
G	8,140[2]	393	2,007	2.5	263.0	263.0	263.9	0.9
H	8,340[2]	353	2,208	2.3	263.5	263.5	264.3	0.8

[1]Feet above mouth
[2]Feet above corporate limits
[3]This width extends beyond corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF NEW BRITAIN, PA
(BUCKS CO.)

FLOODWAY DATA

NESHAMINY CREEK - WEST BRANCH NESHAMINY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
West Branch Neshaminy Creek (continued)								
I	8,690[1]	236	1,443	3.5	264.0	264.0	264.6	0.6
J	9,290[1]	125	976	5.2	264.8	264.8	265.4	0.6
K	9,510[1]	163	1,352	3.7	265.2	265.2	265.8	0.6
L	10,070[1]	115	867	5.8	265.6	265.6	266.1	0.5
M	11,190[1]	243	1,558	2.6	266.9	266.9	267.9	1.0
N	12,490[1]	83	646	6.2	268.2	268.2	268.8	0.6
Tributary to West Branch Neshaminy Creek								
A	1,800[2]	60	193	4.8	268.0	268.0	268.4	0.4
B	2,400[2]	30	89	8.4	274.6	274.6	274.6	0.0
C	3,200[2]	25	91	8.2	289.3	289.3	289.3	0.0
D	3,480[2]	42	169	3.4	297.4	297.4	297.4	0.0
E	4,240[2]	84	132	4.4	311.3	311.3	311.4	0.4
F	4,680[2]	60	126	4.6	321.6	321.6	321.6	0.0
G	5,360[2]	70	158	3.7	333.6	333.6	333.6	0.0

[1]Feet above corporate limits

[2]Feet above confluence with West Branch Neshaminy Creek

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF NEW BRITAIN, PA
(BUCKS CO.)

FLOODWAY DATA

WEST BRANCH NESHAMINY CREEK - TRIBUTARY TO WEST BRANCH NESHAMINY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Railroad Creek								
A	1,260	45	54	2.1	253.4	250.3[2]	250.3	0.0
B	1,930	32	59	2.0	253.4	251.3[2]	251.4	0.1
C	2,010	30	59	1.9	253.4	251.5[2]	251.6	0.1
D	2,050	58	46	2.5	253.4	251.5[2]	251.6	0.1
E	2,420	31	36	3.2	253.8	253.8	253.8	0.0
F	2,860	36	39	2.9	256.7	256.7	256.7	0.0
G	3,210	37	79	1.5	257.3	257.3	257.3	0.0

[1]Feet above confluence with West Branch Neshaminy Creek

[2]Elevation computed without consideration of backwater effects from West Branch Neshaminy Creek

TABLE 2

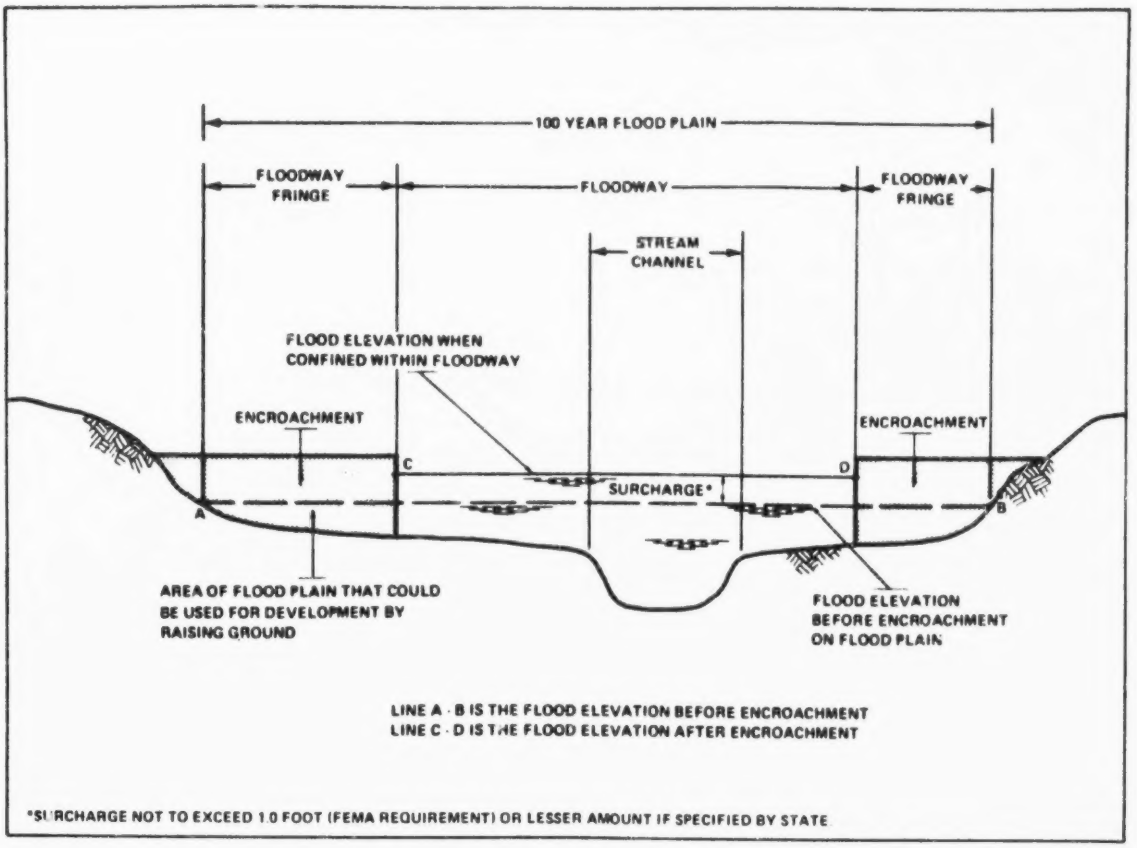
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF NEW BRITAIN, PA

(BUCKS CO.)

FLOODWAY DATA

RAILROAD CREEK


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FLOODWAY SCHEMATIC

Figure 2

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in Table 2 for certain downstream cross sections of Railroad Creek are lower than the regulatory flood elevations in that area, which must take into account the 100-year flooding due to backwater from other sources.

5.0 INSURANCE APPLICATION

To establish actuarial insurance rates, data from the engineering study must be transformed into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source studied in detail in the Township of New Britain.

5.1 Reach Determinations

Reaches are defined as sections of floodplain that have relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This

difference may not have a variation greater than that indicated in the following tabulation for more than 20 percent of the reach:

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the flooding sources of the Township of New Britain are shown on the Flood Profiles (Exhibit 1) and summarized in Table 3.

5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is used to establish relationships between depth and frequency of flooding in any reach. This relationship is then used with depth-damage relationships for various classes of structures to establish actuarial insurance rate tables.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations rounded to the nearest one-half foot, multiplied by 10, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water-surface elevations is greater than 10.0 feet, it is rounded to the nearest whole foot.

5.3 Flood Insurance Zones

Flood insurance zones and zone numbers are assigned based on the type of flood hazard and the FHF, respectively. A unique zone number is associated with each possible FHF, and varies from 1 for a FHF of 005 to a maximum of 30 for a FHF of 200 or greater.

Zone A: Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.

Zones A1, A2, and A4: Special Flood Hazard Areas inundated by the 100-year flood; with base flood elevations shown, and zones subdivided according to FHFs.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Neshaminy Creek Reach 1	04,05	-2.1	-0.6	+2.0	020	A4	Varies
West Branch Neshaminy Creek Reach 1	01,04	-1.8	-0.5	+1.2	020	A4	Varies
Tributary to West Branch Neshaminy Creek Reach 1	04	-0.7	-0.2	+0.5	005	A1	Varies
Railroad Creek Reach 1	01	-0.0	-0.0	+0.0	005	A2	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF NEW BRITAIN, PA
(BUCKS CO.)

FLOOD INSURANCE ZONE DATA

NESHAMINY CREEK - WEST BRANCH NESHAMINY CREEK - TRIBUTARY TO WEST BRANCH NESHAMINY CREEK - RAILROAD CREEK

Zone B: Areas between the Special Flood Hazard Areas and the limits of the 500-year flood; areas that are protected from the 100- or 500-year floods by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.

Zone C: Areas of minimal flooding; not subdivided.

Flood elevation differences, FHFs, flood insurance zones, and base flood elevations for the flooding sources studied in detail in the community are shown in Table 3.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Township of New Britain is, for insurance purposes, the principal result of the Flood Insurance Study. This map contains the official delineation of flood insurance zones and base flood elevations. Base flood elevation lines show the locations of the expected whole-foot water-surface elevation of the base (100-year) flood. The base flood elevations and zone numbers are used by insurance agents, in conjunction with structure elevations and characteristics, to assign actuarial insurance rates to structures and contents insured under the National Flood Insurance Program.

6.0 OTHER STUDIES

In connection with the design of the reservoir system on Neshaminy Creek, the SCS has done work in determining flood elevation reductions at various points along Neshaminy Creek and its tributaries. The Neshaminy Work Plan, as well as the Environmental Impact Statement for the reservoir project, indicates expected flood stage reductions (References 10 and 11). These reductions indicated by the SCS are for the entire project of 10 flood control reservoirs after completion. At present only half of the reservoirs have been built.

Flood Insurance Studies for the Borough of Chalfont and the Township of Hatfield are currently being prepared (References 4 and 13). The results of those studies will be in exact agreement with the results of this study.

A Flood Insurance Study has been published for the Borough of New Britain (Reference 12). The results of this study are in agreement with the results of that study.

7.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, Liberty Square Building (Second Floor), 105 South Seventh Street, Philadelphia, Pennsylvania 19106.

8.0 BIPLIOGRAPHY AND REFERENCES

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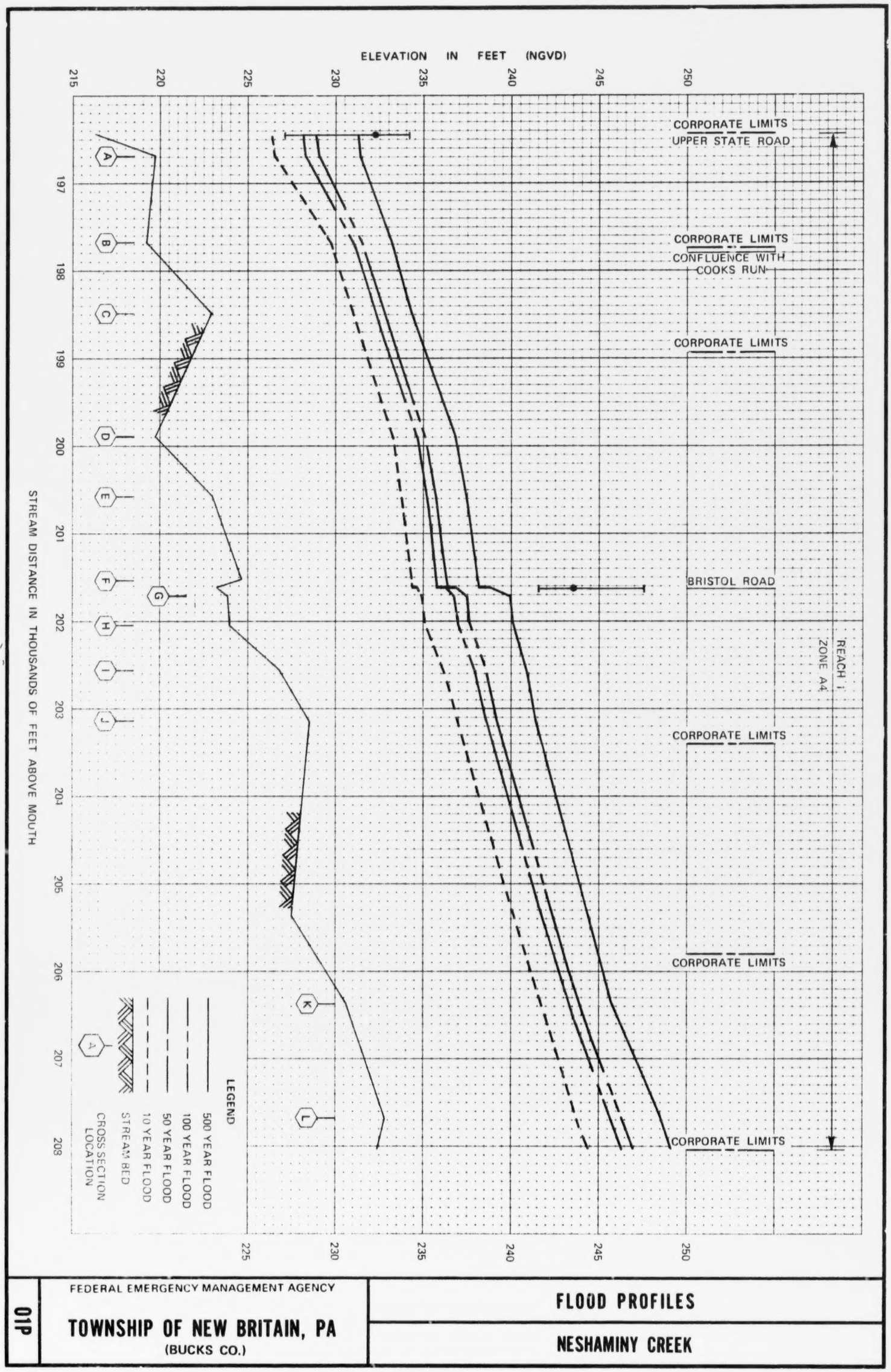

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF NEW BRITAIN, PA

(BUCKS CO.)

FLOOD PROFILES

NESHAMINY CREEK

01P

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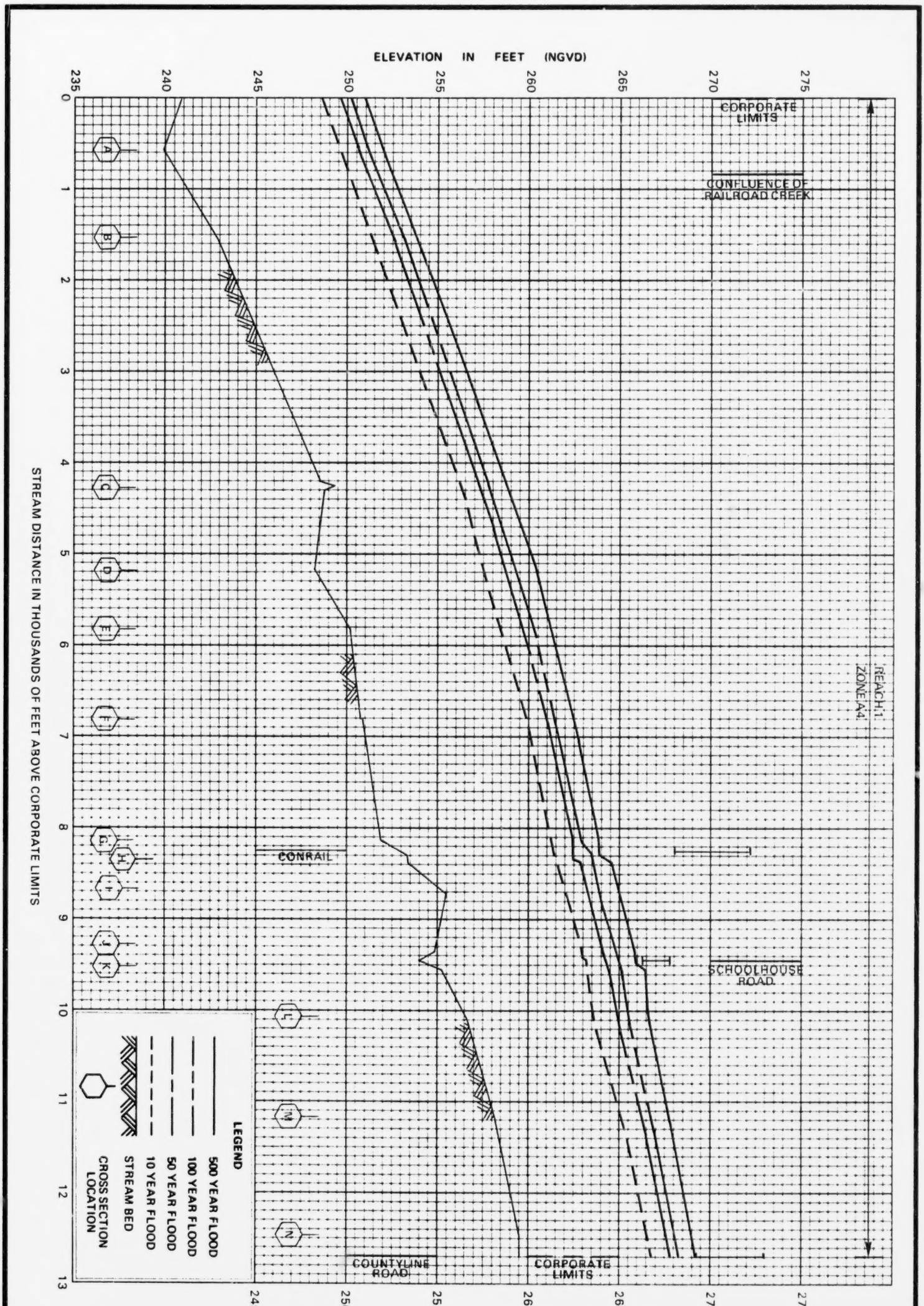


02P

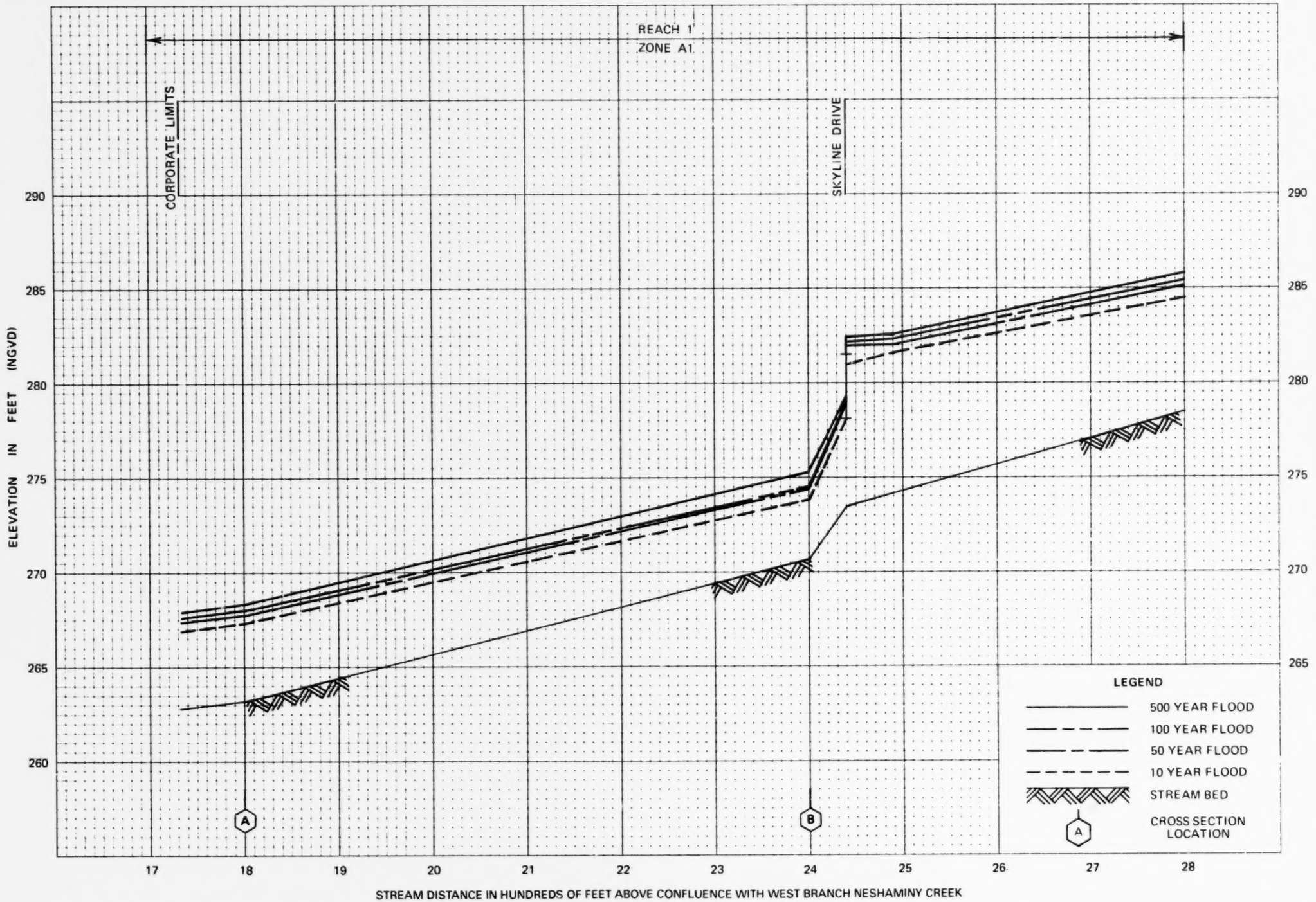
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF NEW BRITAIN, PA

(BUCKS CO.)

FLOOD PROFILES

WEST BRANCH NESHAMINY CREEK



FLOOD PROFILES

TRIBUTARY TO WEST BRANCH NESHAMINY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF NEW BRITAIN, PA
(BUCKS CO.)

03P

REACH 1
ZONE A1

U.S. ROUTE 202

HAMPSHIRE DRIVE

ELEVATION IN FEET (NGVD)

310
305
300
295
290
285
280
275

28 29 30 31 32 33 34 35 36 37 38 39

STREAM DISTANCE IN HUNDREDS OF FEET ABOVE CONFLUENCE WITH WEST BRANCH NESHAMINY CREEK

C D

LEGEND

500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
A CROSS SECTION LOCATION

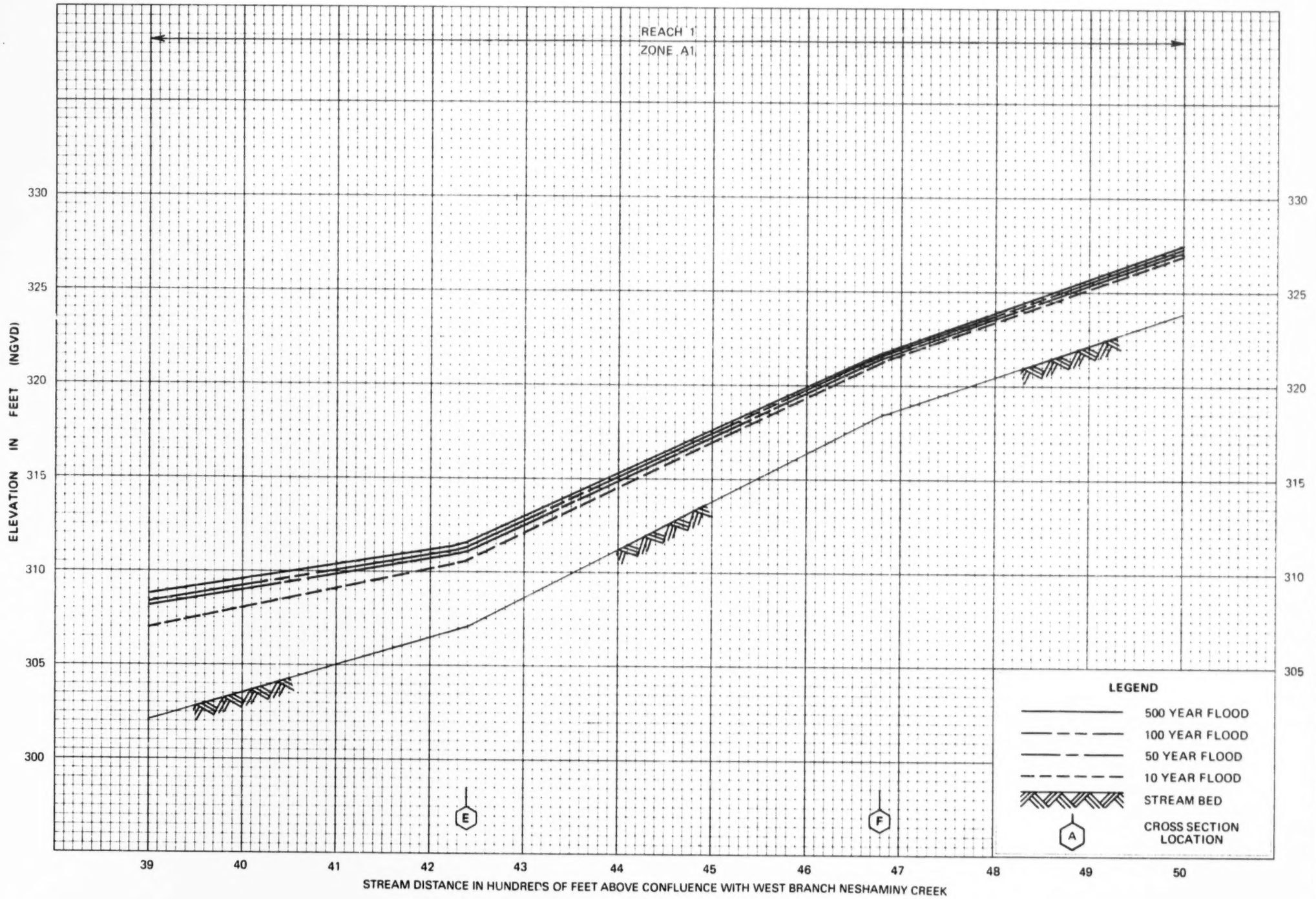
FLOOD PROFILES

TRIBUTARY TO WEST BRANCH NESHAMINY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF NEW BRITAIN, PA
(BUCKS CO.)

04P



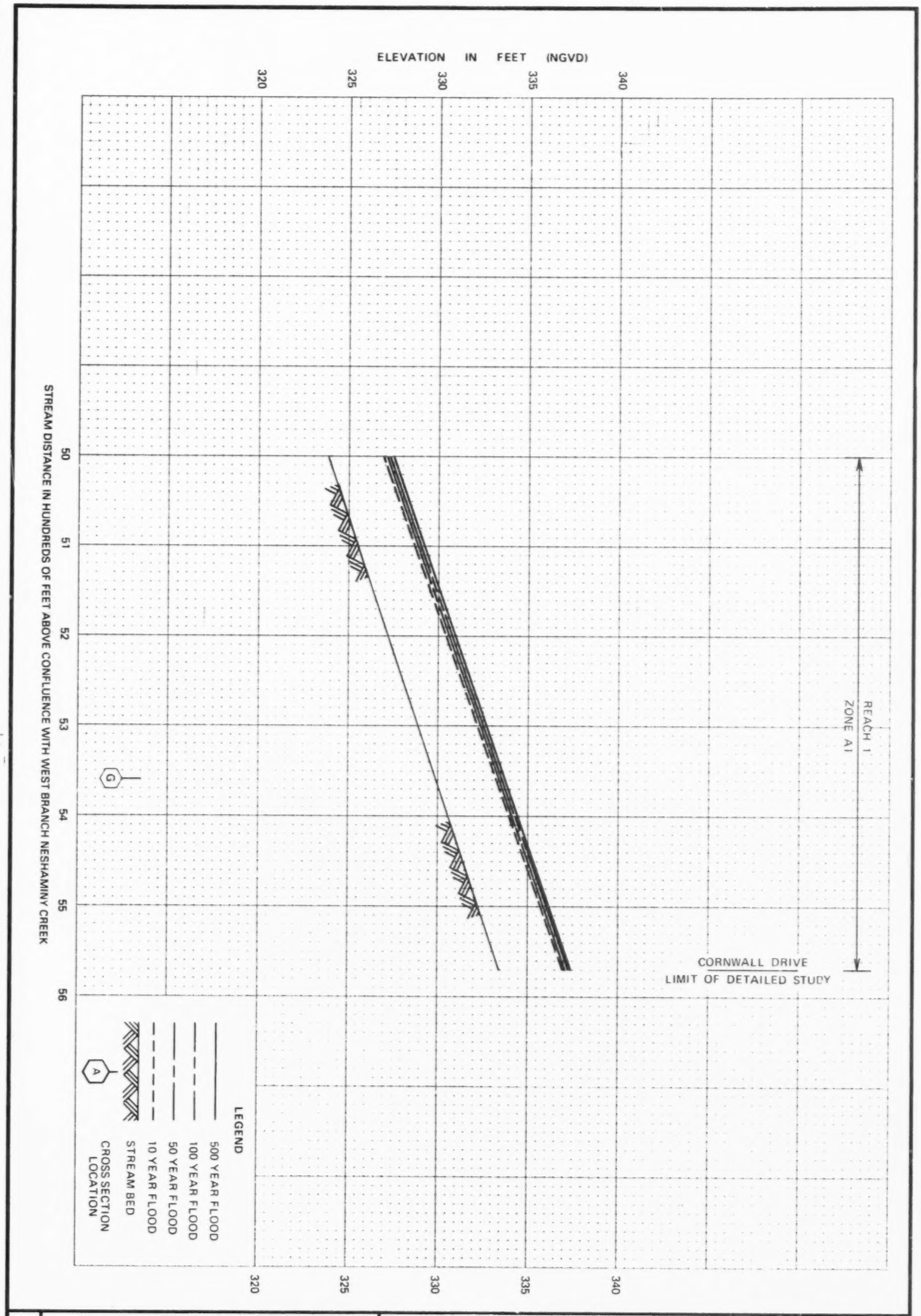
FLOOD PROFILES

TRIBUTARY TO WEST BRANCH NESHAMINY CREEK

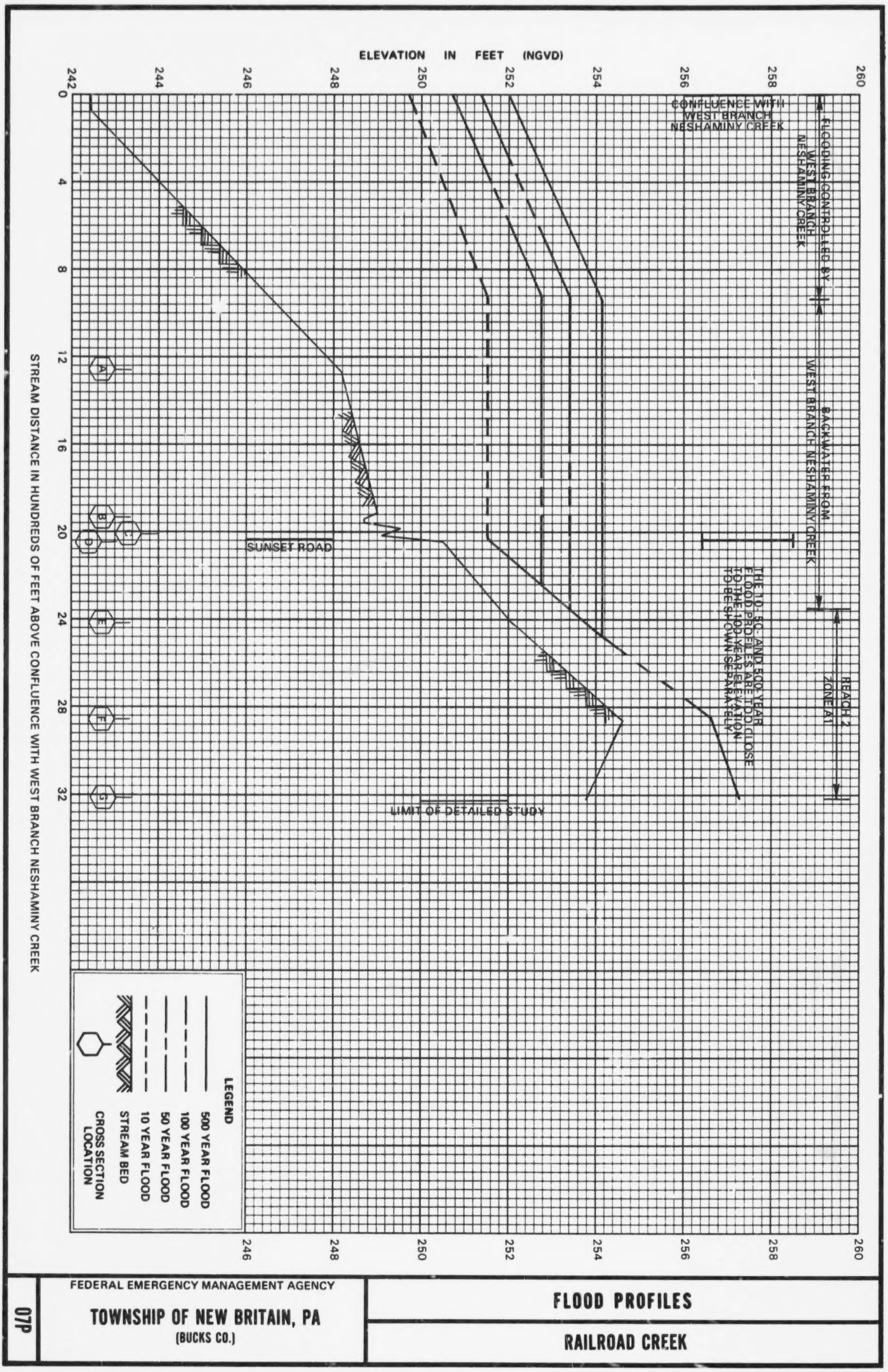
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF NEW BRITAIN, PA
(BUCKS CO.)

05P



06P	FEDERAL EMERGENCY MANAGEMENT AGENCY **TOWNSHIP OF NEW BRITAIN, PA** (BUCKS CO.)	**FLOOD PROFILES** **TRIBUTARY TO WEST BRANCH NESHAMINY CREEK**



FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF NEW BRITAIN, PA
(BUCKS CO.)

FLOOD PROFILES

RAILROAD CREEK

07P